CHAPTER 6
STRUCTURAL STEEL

SIFC-601.0 GENERAL

601.1 Scope: The requirements of this chapter and BNBC Sections 1705.3 and 1705.12 shall apply when construction includes structural hot-rolled steel building elements as listed in Section SIFC-302.1 of this Special Inspections Document.

601.2 Steel Fabrication: Structural steel fabricators shall be subject to special inspections as required by Section SIFC-603.0.

601.3 Steel Erection: Structural steel elements shall be subject to special inspections as required by Section SIFC-604.0. Construction shall conform to the AISC Code of Standard Practice. Adequate guying and/or bracing shall be used during the erection process to maintain the stability of the structure. Structural steel, joists, etc. shall not be erected on concrete or masonry footings, piers, walls, etc. less than 7 days old unless the concrete or masonry strength criteria that have been established by the ***Structural Engineer of Record*** **(SER)** for carrying such loads are satisfied.

SIFC-602.0 FABRICATION AND ERECTION DOCUMENTS

602.1 Review and Approval: The structural steel *fabrication and erection documents* shall be submitted for review and approval to the **SER** and to **FCCSS** prior to fabrication and erection of steel elements. The **General Contractor (GC)** shall submit two sets of **SER**-approved *fabrication and erection documents* to **FCCSS** for approval. After County review and approval, **FCCSS** will return one set of *County-approved fabrication and erection documents* for use on the job site. *County-approved documents* shall be used by the ***Special Inspections Engineer of Record*** **(SIER)** to conduct special inspections during construction.

602.2 Preparation of Fabrication and Erection Documents: The structural steel *fabrication and erection documents* shall include designs and details for welded and bolted connections. Details for welded connections shall clearly indicate the seismic-resisting elements of buildings of Seismic Category C. Details for bolted connections shall clearly indicate the type of connection used in the design (bearing or slip-critical), the amount of tensioning required (snug tight or fully tensioned) and the ASTM specifications for the bolts, nuts and washers.

602.3 SER Review and Approval: The structural steel *fabrication and erection documents* shall be reviewed and approved by the **SER** in accordance with the following requirements:

a. Review and Approval Stamp: Each individual *fabrication and erection document* shall bear the review and approval stamp of the **SER** or be otherwise individually identified as being reviewed and approved (see Section SIFC-1401.0). Submission packages of *fabrication and erection documents* may be accompanied by an index

sheet bearing the approval stamp and signature. If an index sheet is employed, it shall specifically list the drawings, and dates thereof, to which the approval stamp and signature apply. Subsequent submissions of revised drawings shall be reflected on the index sheet.

b. **Primary Structural System:** The **SER** shall review and approve the submitted documents for compliance with *County-approved construction documents*, including the review and approval of any connections developed by the steel fabricator. The **SER** shall indicate approval with a signed and sealed statement, attached to the documents, accepting responsibility for the design of connections which shall include language as given in either:

- "The structural steel fabrication and erection documents have been reviewed, including a verification of all the structural steel connections shown. Where marked "Approved" or "Approved as Noted", I accept full responsibility for the design of the connections to support the design loads required by the County-approved construction documents for the completed project."; or,

- "I have reviewed the structural steel fabrication and erection documents _____ as prepared by _____ for the above referenced project. My review and approval or approval as noted dated _____ included a verification of all the structural steel connections shown. I accept the responsibility for the design of the connections to support the design loads required by the County-approved construction documents for the completed project."

c. **Secondary Structural Systems:** *Secondary elements* are required to be reviewed and approved by the **SER** only for their effects on the *primary structural system*.

SIFC-603.0 INSPECTION OF STEEL FABRICATORS

603.1 Steel Fabricators: Where fabrication of structural members and assemblies is being performed on the premises of a fabricator's shop, the **SIER** shall provide special inspection of fabrication procedures as required by Section SIFC-603.2 and of the fabricated items as required by Sections SIFC-604.1 and 604.2.

Exception: Special inspection of the steel fabricator as required by Section SIFC-603.2 shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall submit to the **SIER** a detailed procedure for material control which demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, grade and mill test reports for the main stress-carrying elements and bolts can be determined.

603.2 Fabrication Procedures: The **SIER** shall verify that the fabricator maintains detailed

fabrication and quality control procedures which provide a basis for control of workmanship and the fabricator's ability to conform to approved drawings, project specifications, and referenced standards. The **SIER** shall review the procedures for completeness and adequacy relative to the Code requirements for the fabricator's scope of work. This shall include fabrication procedures and material traceability in accordance with AISC specifications and welder certification in accordance with AWS D1.1. The **SIER** shall verify that the fabricator has a detailed procedure for material control which demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, grade and mill test reports for the main stress-carrying elements and bolts can be determined.

a. **Certification:** The fabricator may demonstrate to the **SIER** that the requirements of Section SIFC-603.2 have been met by furnishing evidence of compliance with the AISC Quality Certification Program or its equivalent, in the appropriate category.

b. **Procedures Implementation:** The **SIER** shall verify in writing to **FCCSS** that the fabricator is properly implementing the fabrication and quality control procedures outlined above. Verification may be on a job basis or by inspection within the previous twelve months.

SIFC-604.0 INSPECTION OF STEEL ELEMENTS

604.1 **Material Receiving:** The **SIER** shall inspect all structural elements, welding material, and high strength bolts for conformance with Table SIFC-601. High strength bolts and nuts shall be clearly marked with an identifiable manufacturer's mark on both the bolt head and nut. All shipments of high-strength bolts, nuts and washers, whether from manufacturer, distributor, or reseller, shall include manufacturer's current test reports for chemical composition (ASTM A751) and mechanical properties, including proof load testing (ASTM F606).

TABLE SIFC-601
SPECIAL INSPECTIONS FOR STEEL MATERIALS

Material	Inspection Required	Reference for Criteria
Structural Steel	1. Material identification markings. 2. Conformance to ASTM standards specified in the approved plans and specifications.	ASTM A6 or ASTM A588 Provide *certified* test reports in accordance with ASTM A6 or ASTM A588
Bolts, Nuts, Washers	1. Material identification markings. 2. Conformance to ASTM standards specified by the design engineer. Manufacturer's certificate of compliance is required. 3. Manufacturer's mark.	Applicable ASTM material specifications. AISC Specification for Structural Steel -- ASD : Sec. A3.4 LRFD : Sec. A3.3
Weld Filler Materials	1. Conformance to AWS Specification as specified in the approved plans and specifications. Manufacturer's certificate of compliance is required.	AISC Specification for Structural Steel -- ASD : Sec. A3.6 LRFD : Sec. A3.5

604.2 Erection: The **SIER** shall perform special inspections of bolts, welding, connections, details and spray-on fireproofing as specified below. Any discrepancies between the *County-approved construction documents* and *County-approved structural steel fabrication and erection documents* shall be brought to the immediate attention of the **SER** and **FCCSS**. All steel elements shall be inspected before they are covered by fireproofing or are otherwise concealed.

a. High Strength Bolts: Installation shall conform to the *County-approved construction documents, County-approved structural steel fabrication and erection documents,* and the RCSC/AISC Specification for Structural Joints Using A325 or A490 Bolts. In addition, if the "turn-of-the-nut" method is used, the installer shall ensure that the bolt and nut are marked by crayon or other means to afford a visual indication of rotation. Inspection shall be as specified in Section 9 of the RCSC/AISC Specification for Structural Joints Using A325 or A490 Bolts.

In the event any bolt, nut or washer is broken during normal installation (except bolts purposely over-torqued in order to draw the parts together), the **SIER** shall bring such failures to the immediate attention of the **SER** and **FCCSS**. The **SIER** shall supervise the on job-site proof load testing of any suspect bolt(s) per ASTM and AISC standards. Should the bolts fail load testing, they shall be rejected and the **SER** shall make recommendations in writing for remedial actions. All test results and

recommendations shall be reported to **FCCSS**.

b. **Welding:** All welders and weld special inspectors shall be certified in accordance with AWS D1.1. Weld inspection shall be in conformance with Section 6 of AWS D1.1 and BNBC Section 1705.3.3.2, including special inspections of the structural seismic-resisting system required by BNBC Sections 1705.3.3.2.1 - 1705.3.3.2.3 of buildings assigned to Seismic Performance Category C.

c. **Rigid or Semi-Rigid Connections:** When field welding of rigid or semi-rigid connections is required, or when bolted connections are required to meet a minimum pretension beyond snug tight, the **SIER** shall conduct special inspections of the connections.

d. **Details:** The **SIER** shall perform inspections of the steel frame to verify compliance with the details shown on the *County-approved construction documents* and the *County-approved fabrication and erection documents*, such as bracing, stiffening, member locations, and proper application of joint details at each connection.

e. **Spray-on Fireproofing:** The **SIER** shall inspect and test spray-on fireproofing in accordance with BNBC Section 1705.12, including preparation of structural member surfaces, verification of substrate ambient temperatures and ventilation requirements, and testing samples for thickness, adhesion and density. Frequency of sampling shall be as specified in BNBC Sections 1705.12.3.1 and 1705.12.3.2, not less than once for every 1,000 square feet of sprayed surface area of floors, walls and roofs and not less than 25 percent of the structural frame members of each floor. Test methods shall be as specified by ASTM E605 and E736 for thickness, adhesion and density. Inspection reports shall include the fireproofing design number(s) as shown on the *County-approved construction documents*.

SIFC-605.0 COMPLETION OF STRUCTURAL STEEL CONSTRUCTION

Upon completion of structural steel construction, including connections and spray-on fireproofing, the **SIER** shall, after review and approval by the **SER**, submit a *Completion Letter* to **FCCSS** and shall indicate the date of completion on the *Final Report of Special Inspections*.